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700 MHz Pre-Assignment Rules

Introduction

A process for doing the initial block assignments of 700 MHz channels before details of actual system deployments is required. In this initial phase, there is little actual knowledge of what specific equipment is to be deployed and where the sites will be. As a result, a high level simplified method is proposed to establish guidelines for frequency coordination. When actual systems are deployed, additional details will be known and the system designers will be required to select specific sites and supporting hardware to control interference.

Overview
Assignments will be based on a defined service area of each applicant. For Public Safety entities this will normally be a geographically defined area such as city, county or by a data file consisting of line segments creating a polygon that encloses the defined area. TIA/EIA TSB88-A (or latest version) will be used to determine harmful interference assuming 40 dBμ, or greater, signal in all systems coverage areas.

For co-channel assignments, the 40dBμ contour will be allowed to extend beyond the defined service area by 3 to 5 miles, depending on the type of environment, urban, suburban or low density. The interfering co-channel 15 dBμ contour will be allowed to touch but not overlap the 40 dBμ contour of the system being evaluated. All contours are (50,50). TIA/EIA TSB88-A (or latest version) will be used to determine harmful interference assuming 40 dBμ, or greater, signal in all systems coverage areas.

For adjacent and alternate channels, the interfering channels 60 dBμ will be allowed to touch but not overlap the 40 dBμ contour of the system being evaluated. All contours are (50,50). TIA/EIA TSB88-A (or latest version) will be used to determine harmful interference assuming 40 dBμ, or greater, signal in all systems coverage areas.

7.4.1.1 Discussion

The FCC limits the maximum field strength to 40 dB relative to 1μV/m (customarily denoted as 40dBμ). It is assumed that this limitation will be applied similarly to the way it is applied in the 821-824/866/869 MHz band. That is, a 40 dBμ field strength can be deployed up to a defined distance from the edge of the service area, based on the size of the service area or type of applicant, i.e. city, county or statewide system. This is important as the potential for interference from CMRS infrastructure demands that public safety systems have adequate margins for reliability in the presence of interference. The value of 40 dBμ corresponds to a signal of -92.7 dBm, received by a half-wavelength dipole (λ/2) antenna. The thermal noise floor for a 6.25 kHz receiver would be in the range of -126 dBm, so there is a margin of approximately 33 dB available for "noise limited" reliability. Figure 1 shows show the various interfering sources and how they accumulate to form a composite noise floor that can be used to determine the "reliability" or probability of achieving the desired performance in the presence of various interfering sources with differing characteristics.

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Allowing for a 3 dB reduction in the available margin due to CMRS OOBE noise lowers the reliability and/or the channel performance of Public Safety systems. TIA TR8 made this allowance during the meetings in Mesa, AZ, January 2001. In addition, there are various channel bandwidths with different performance criteria and unknown adjacent and alternate channel assignments need to be accounted for. The co-channel and adjacent/alternate sources are shown in the right hand side of Figure 1. There would be a single co-channel source, but potentially several adjacent or alternate channel sources involved.

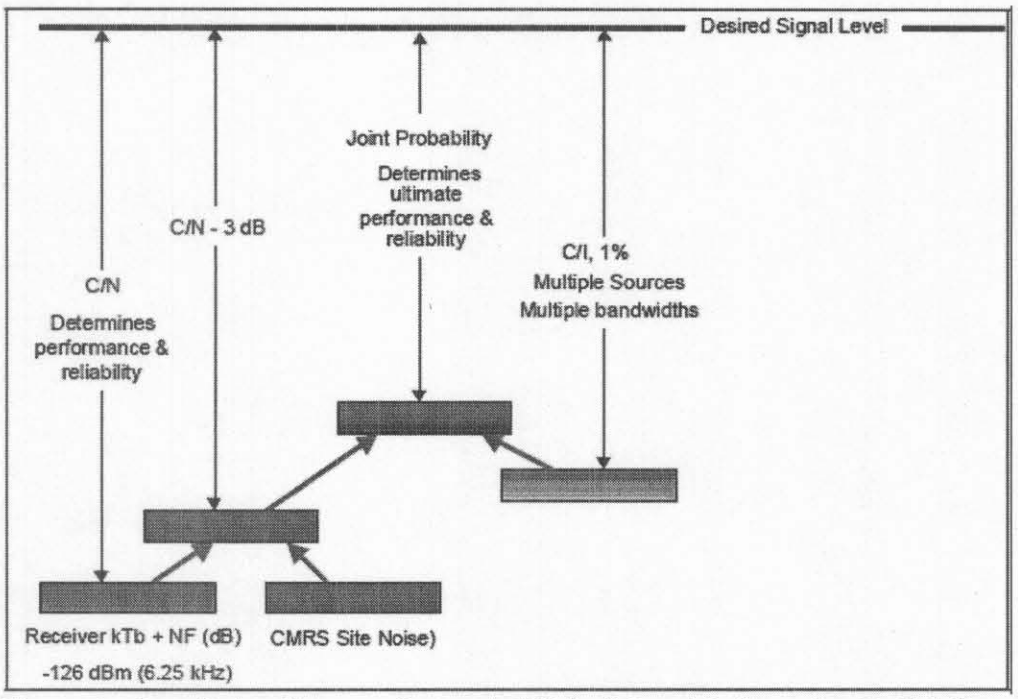

Figure 1 - Interfering Sources Create A "Noise" Level Influencing Reliability

It is recommended that co-channel assignments limit the C/I at the edge (worst case mile) be sufficient to limit that interference to <1%. A C/I ratio of 26.4 dB plus the required capture value required to achieve this goal. A 17 - 20 dB C/N is required to achieve channel performance. Table shows estimated performance considering the 3 dB noise floor rise at the 40 dBμ signal level. Performance varies due to the different Cf/N requirements of the different modulations and channel bandwidths. These values are appropriate for a mobile on the street, but are considerably short to provide reliable communications to portables inside buildings.

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Comparison of Joint Reliability for various configurations				
Channel Bandwidth	6.25 kHz	12.5 kHz	12.5 kHz	25.0 kHz
Receiver ENBW (kHz)	6	6	9	18
Noise Figure(10 dB)	10	10	10	10
Receiver Noise Floor (dBm)	-126.22	-126.22	-124.46	-121.45
Rise in Noise Floor (dB)	3.00	3.00	3.00	3.00
New Receiver Noise Floor (dB)	-123.22	-123.22	-121.46	-118.45
40 dBu = -92.7 dBm	-92.7	-92.7	-92.7	-92.7
Receiver Capture (dB)	10.0	10.0	10.0	10.0
Noise Margin (dB)	30.52	30.52	28.76	25.75
C/N Required for DAQ = 3	17.0	17.0	18.0	20.0
C/N Margin (dB)	**13.52**	**13.52**	**10.76**	**5.75**
Standard deviation (8 dB)	8.0	8.0	8.0	8.0
Z	1.690	1.690	1.345	0.718
Noise Reliability (%)	**95.45%**	**95.45%**	**91.06%**	**76.37%**
C/I for <1% prob of capture	36.4	36.4	36.4	36.4
I (dBu)	3.7	3.7	3.7	3.7
I (dBm)	-129.0	-129.0	-129.0	-129.0
Joint Probability (C & I)	**94.2%**	**94.2%**	**90.4%**	**75.8%**
40 dBu = -92.7 dBm @ 770 MHz				

Table 1 Joint Probability For Project 25, 700 MHz Equipment Configurations.

To analyze the impact of requiring portable in building coverage, several scenarios are presented. The different scenarios involve a given separation from the desired sites. Then the impact of simulcast is included to show that the 40 dBμ must be able to fall outside the edge of the service area. From the analysis, recommendations of how far the 40 dBμ extensions should be allowed to occur are made.

Table 2 Estimates urban coverage where simulcast is required to achieve the desired portable in building coverage. Several assumptions are required to use this estimate.

- Distance from the location to each site. Equal distance is assumed.
- CMRS noise is reduced when entering buildings. This is not a guarantee as the type of deployments is unknown. It is possible that CMRS units may have transmitters inside buildings. This could be potentially a large contributor unless the CMRS OOBE is suppressed to TIA's most recent recommendation and the "site isolation" is maintained at 65 dB minimum.
- The 40 dBμ is allowed to extend beyond the edge of the service area boundary.
- Other configurations may be deployed utilizing additional sites, lower tower heights, lower ERP and shorter site separations.

Estimated Performance at 2.5 miles from each site				
Channel Bandwidth	6.25 kHz	12.5 kHz	12.5 kHz	25.0 kHz

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Receiver Noise Floor (dBm)	-126.20	-126.20	-124.50	-118.50
Signal at 2.5 miles (dBm)	-72.7	-72.7	-72.7	-72.7
Margin (dB)	53.50	53.50	51.80	45.80
C/N Required for DAQ = 3	17.0	17.0	18.0	20.0
Building Loss (dB)	20	20	20	20
Antenna Loss (dBd)	8	8	8	8
Reliability Margin	8.50	8.50	5.80	-2.20
Z	1.0625	1.0625	0.725	-0.275
Single Site Noise Reliability (%)	**85.60%**	**85.60%**	**76.58%**	**39.17%**
Simulcast with 2 sites	97.93%	97.93%	94.51%	62.99%
Simulcast with 3 sites	99.70%	99.70%	98.71%	77.49%
Simulcast with 4 sites	99.96%	99.96%	99.70%	86.30%

Table 2, Estimated Performance From Site(s) 2.5 Miles From Typical Urban Buildings.

Table 2 shows for the example case of 2.5 miles that simulcast is required to achieve public safety levels of reliability. The difference in performance margin requirements would require more sites and closer site-to-site separation for wider bandwidth channels. Figures 2 and 3 show how the configurations would potentially be deployed for a typical site with 240 Watts ERP. This is based on:

- 75 Watt transmitter, 18.75 dBW
- 200 foot tower
- 10 dBd 180 degree sector antenna +10.0 dBd
- 5 dB of cable/filter loss. - 5.0 dB

23.75 dBW ≈ 240 Watts (ERPd)

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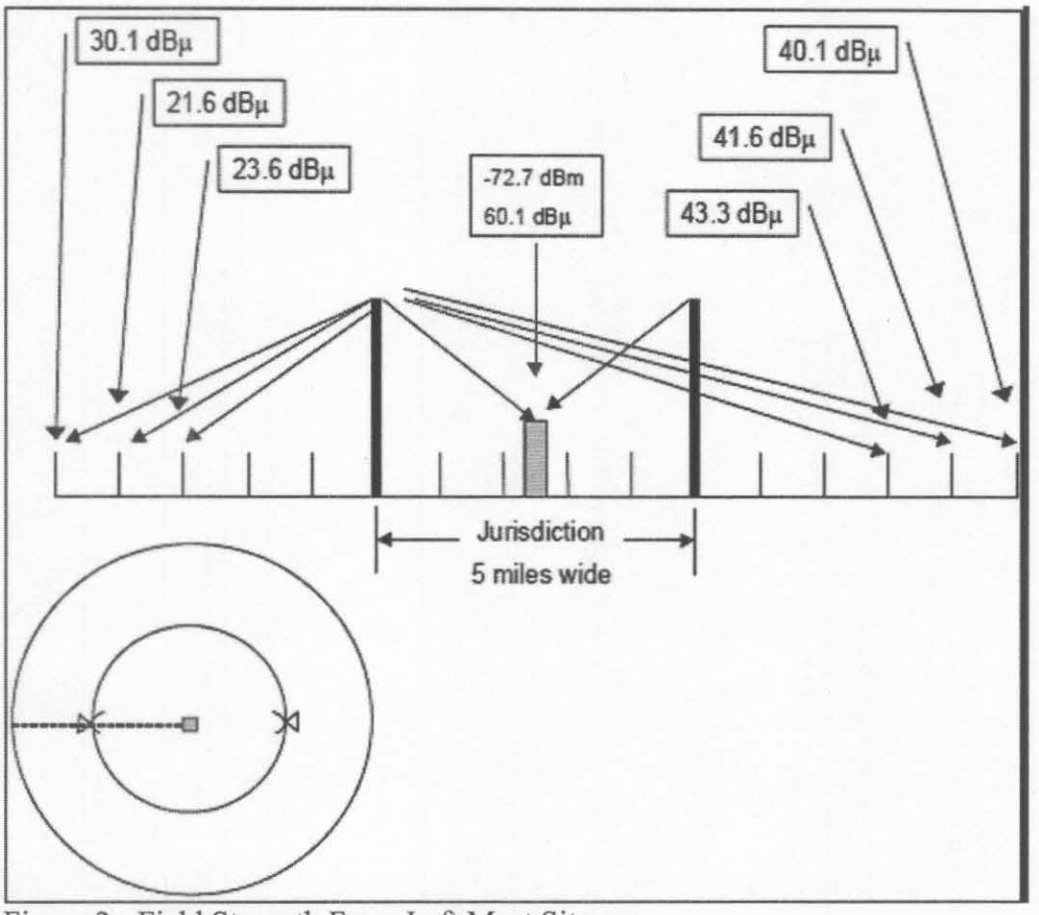

Figure 2 - Field Strength From Left Most Site.

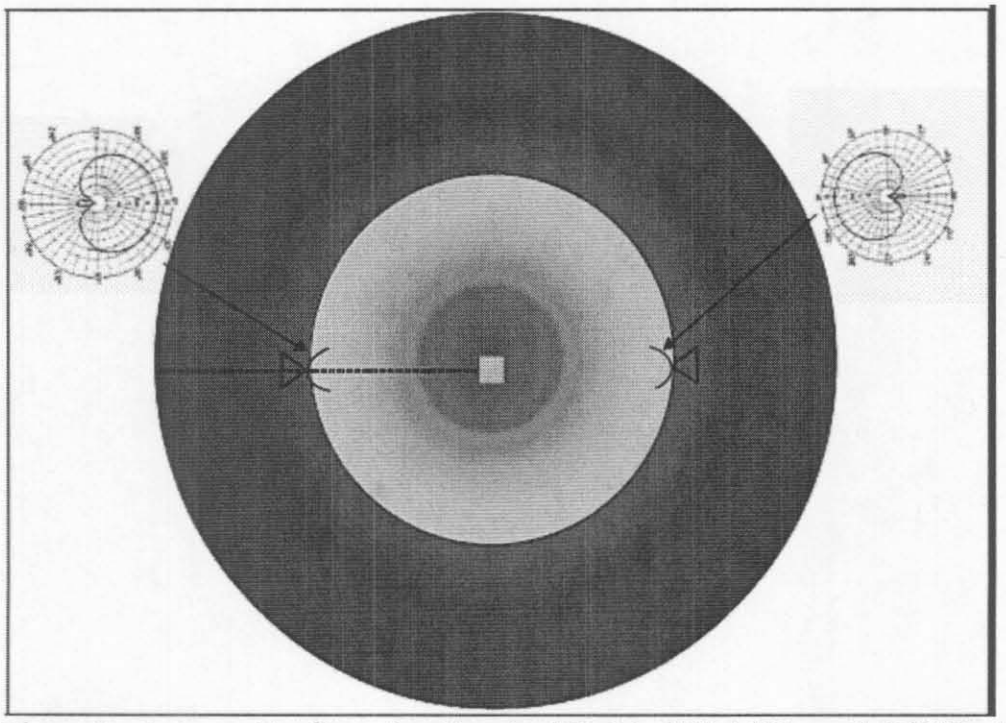

Figure 3 - Antenna Configuration Required To Limit Field Strength Off "Backside"

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Figure 2 is for an urbanized area with a jurisdiction of a 5-mile circle. To provide the necessary coverage to portables in buildings at the center of the jurisdiction requires that the sites be placed along the edge of the service area utilizing direction antennas oriented toward the center of the service area (Figure 3). In this case, at 5 miles beyond the edge of the service area, the sites would produce composite field strength of approximately 40 dBμ. Since one site is over 10 dB dominant, the contribution from the other site is not considered. The control of the field strength behind the site relies on a 20 dB antenna with a Front to Back Ratio (F/B) specification as shown in Figure 3. This performance may be optimistic due to backscatter off local obstructions in urbanized areas. However, use of antennas on the sides of buildings can assist in achieving better F/B ratios and the initial planning is not precise enough to prohibit using the full 20 dB.

The use of a single site at the center of the service area is not normally practical. To provide the necessary signal strength at the edge of the service area would produce field strength 5 miles beyond in excess of 44 dBμ. However, if the high loss buildings were concentrated at the service area's center, then potentially a single site could be deployed, assuming that the building loss sufficiently decreases near the edge of the service area allowing a reduction in ERP to achieve the desired reliability.

The down tilting of antennas to control the 40 dBμ is not practical as the difference in angular discrimination from a 200-foot tall tower at 2.5 miles and 10 miles is approximately 0.6 degrees.
Tables 3 and 4 represent the same configuration, but for less dense buildings. In these cases, the distance to extend the 40 dBm can be determined from Table Z.
Recommendations are made in Table 6

Estimated Performance at 3.5 miles from each site				
Channel Bandwidth	6.25 kHz	12.5 kHz	12.5 kHz	25.0 kHz
Receiver Noise Floor (dBm)	-126.20	-126.20	-124.50	-118.50
Signal at 2.5 miles (dBm)	-77.7	-77.7	-77.7	-77.7
Margin (dB)	48.50	48.50	46.80	40.80
C/N Required for DAQ = 3	17.0	17.0	18.0	20.0
Building Loss (dB)	15	15	15	15
Antenna Loss (dBd)	8	8	8	8
Reliability Margin	8.50	8.50	5.80	-2.20
Z	1.0625	1.0625	0.725	-0.275
Single Site Noise Reliability (%)	**85.60%**	**85.60%**	**76.58%**	**39.17%**
Simulcast with 2 sites	97.93%	97.93%	94.51%	62.99%
Simulcast with 3 sites	99.70%	99.70%	98.71%	77.49%
Simulcast with 4 sites	99.96%	99.96%	99.70%	86.30%

Table 3 - Lower Loss Buildings, 3.5 Mile From Site(s)

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Estimated Performance at 5.0 miles from each site				
Channel Bandwidth	6.25 kHz	12.5 kHz	12.5 kHz	25.0 kHz
Receiver Noise Floor (dBm)	-126.20	-126.20	-124.50	-118.50
Signal at 2.5 miles (dBm)	-82.7	-82.7	-82.7	-82.7
Margin (dB)	43.50	43.50	41.80	35.80
C/N Required for DAQ = 3	17.0	17.0	18.0	20.0
Building Loss (dB)	10	10	10	10
Antenna Loss (dBd)	8	8	8	8
Reliability Margin	8.50	8.50	5.80	-2.20
Z	1.0625	1.0625	0.725	-0.275
Single Site Noise Reliability (%)	**85.60%**	**85.60%**	**76.58%**	**39.17%**
Simulcast with 2 sites	97.93%	97.93%	94.51%	62.99%
Simulcast with 3 sites	99.70%	99.70%	98.71%	77.49%
Simulcast with 4 sites	99.96%	99.96%	99.70%	86.30%

Table 4 - Low Loss Buildings, 5.0 Miles From Site(s)

Note that the receive signals were adjusted to offset the lowered building penetration loss. This produces the same numerical reliability results, but allows increasing the site to building separation and this in turn lowers the magnitude of the "overshoot" across the service area.

Table 5 shows the field strength for a direct path and for a path reduced by a 20 dB F/B antenna. This allows the analysis to be simplified for the specific example being discussed.

Overshoot Distance (mi)	Field Strength (dBμ)	20 dB F/B (dBμ)
1	73.3	53.3
2	63.3	43.3
2.5	60.1	40.1
3	57.5	37.5
4	53.3	33.5
5	50.1	30.1
...	...	
10	40.1	
11	38.4	
12	37.5	
13	36.0	
14	34.5	
15	33.0	

Table 5 - Field Strength Vs. Distance From Site

This allows the overshoot to be 11 miles so the extension of the 40 dbm can be 4 miles for suburbanized territory. For the more rural territory, the limit is the signal strength off the back of the antenna. So the result is that for various types of urbanized areas the offset of the 40 dbm should be:

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Type of Area	Extension (mi.)
Urban (20 dB Buildings)	5
Suburban (15 dB Buildings)	4
Rural (10 dB Buildings)	3

Table 6 - Recommended Extension Distance Of 40 Dbμ Field Strength

The 40 dBμ can then be constructed based on the defined service area without having to perform an actual prediction. Since the 40 dBμ is beyond the edge of the service area, some relaxation in the level of I is reasonable. Therefore a 35 dB ration is recommended and is consistent with what is currently being licensed in the 821-824/866-869 MHz Public Safety band.

Co-Channel Recommendation

- Allow the constructed 40 dBμ (50,50) to extend beyond the edge of the defined service area by the distance indicated in Table 6.
- Allow the Interfering 15 dBμ (50,50) to intercept but not overlap the 40 dBμ contour.

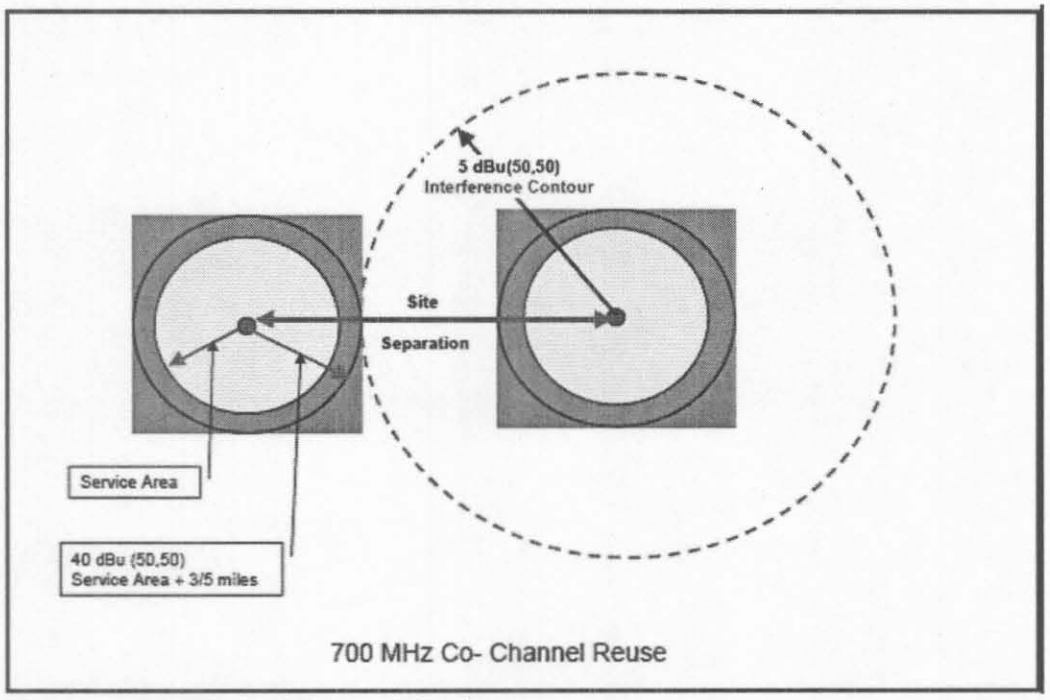

Figure 4 - Co-Channel Reuse Criterion

Adjacent and alternate Channel Considerations

Adjacent and alternate channels are treated as being noise sources that alter the composite noise floor of a victim receiver. Using the 47 CFR § 90.543 values of ACCP can facilitate the coordination of adjacent and alternate channels. The C/I requirements for <1% interference can be reduced by the value of ACCPR. For example to achieve an X dB C/I for the adjacent channel that is -40 dBc a C/I of [X-40] dB is required. Where the

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alternate channel ACP value is -60 dBc, then the C/I = [X-60] dB is the goal for assignment(s). There is a compounding of interference energy, as there are numerous sources, i.e. co channel, adjacent channels and alternate channels plus the noise from CMRS OOBE.

There is insufficient information in 47 CFR § 90.543 to include the actual receiver performance. Receivers typically have "skirts" that allow energy outside the bandwidth of interest to be received. In addition, the FCC defines ACCP differently than does the TIA. The term used by the FCC is the same as the TIA definition of ACP. The subtle difference is that ACCP defines the energy intercepted by a defined receiver filter. ACP defines the energy in a measured bandwidth that is typically wider than the receiver. As a result, the FCC values are optimistic at very close spacing and somewhat pessimistic at wider spacing, as the typical receiver filter is less than the channel bandwidth.

In addition, as a channel bandwidth is increased, the total noise is allowed to rise, as it is initially defined in a 6.25 kHz channel bandwidth. However, the effect is diminished at very close spacing as the noise is rapidly falling off. At greater spacing, the noise is essentially flat and the receiver's filter limits the noise to the specified 3 dB rise in the thermal noise floor.

Digital receivers tend to be less tolerant to interference than analog. Therefore a 3 dB reduction in the C/(I+N) can reduce a DAQ = 3 to a DAQ = 2 which is threshold to complete receiver muting. Therefore at least 17 dB plus the margin for keeping the interference below 1% probability requires a total margin of 43.4 dB. However, this margin would be at the edge of the service area and the 40 dBμ is allowed to extend past the edge of the service area.

Frequency drift is controlled by the FCC requirement for 0.4-ppm stability when locked. This equates to approximately a 1 dB standard deviation, which is negligible when associated with the recommended initial lognormal standard deviation of 8 dB and can be ignored.

Project 25 requires that a transceiver receiver have an ACIPR of 60 dB. This implies that an ACCPR ≥ 65 dB will exist for a "companion receiver". A companion receiver is one that is designed for the specific modulation. At this time the highest likelihood is that receivers will be deploying the following receiver bandwidths at the following channel bandwidths.

Estimated Receiver Parameters	
Channel Bandwidth	Receiver Bandwidth
6.25 kHz	5.5 kHz
12.5 kHz	5.5 or 9 kHz
25 kHz	18.0 kHz

Table 7 - Estimated Receiver Parameters

Based on 47 CFR ¶ 90.543 and the P25 requirement for an ACCPR ≥ 65 dB into a 6.0 kHz channel bandwidth and leaving room for a migration from Phase 1 to Phase 2, allows

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for making the simplifying assumption that 65 dB ACCPR is available for both adjacent 25 kHz block.

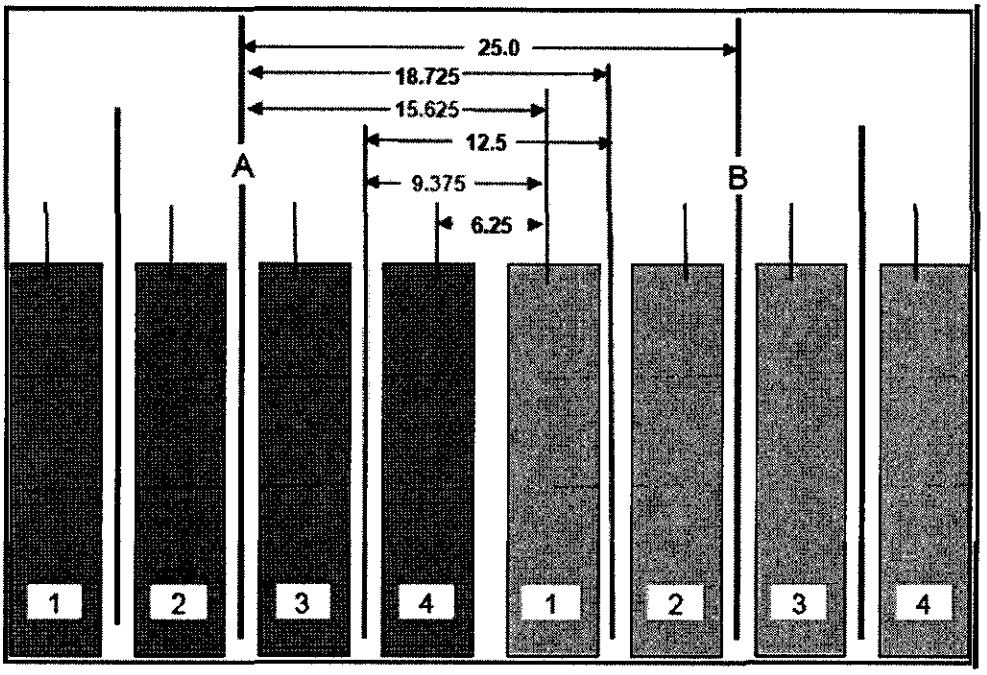

Figure 5, Potential Frequency Separations

Base initial (presorts) on 25 kHz channels. This provides the maximum flexibility by using 65 dB ACCPR for all but one possible combination of 6.25 kHz channels within the 25 kHz allotment.

Case	ACCPR
25 kHz	65 dB
18.725 kHz	65 dB
15.625 kHz	>40 dB
12.5 kHz	65 dB
9.375 kHz	>40 dB
6.25 kHz	65 dB

Table 8 - ACCPR Values For Potential Frequency Separations

All cases meet or exceed the FCC requirement. The most troublesome cases occur where the wider bandwidths are working against a Phase 2 narrowband 6.25 kHz channel. If system designers keep this consideration in mind and move the edge 6.25 kHz channels inward on their own systems, then a constant value of 65 dB ACCPR can be applied across all 25 kHz channels regardless of what is eventually deployed.

For other blocks, it must be assumed that transmitter filtering in addition to transmitter performance improvements with greater frequency separation will further reduce the ACCPR.

Therefore it is recommended that a consistent value of 65 dB ACCPR be used for coordinating adjacent 25 kHz channel blocks. Rounding to be conservative due to the possibility of multiple sources allows the "I" contour to be approximately 20 dB above the 40 dBμ contour, 60 dBμ.

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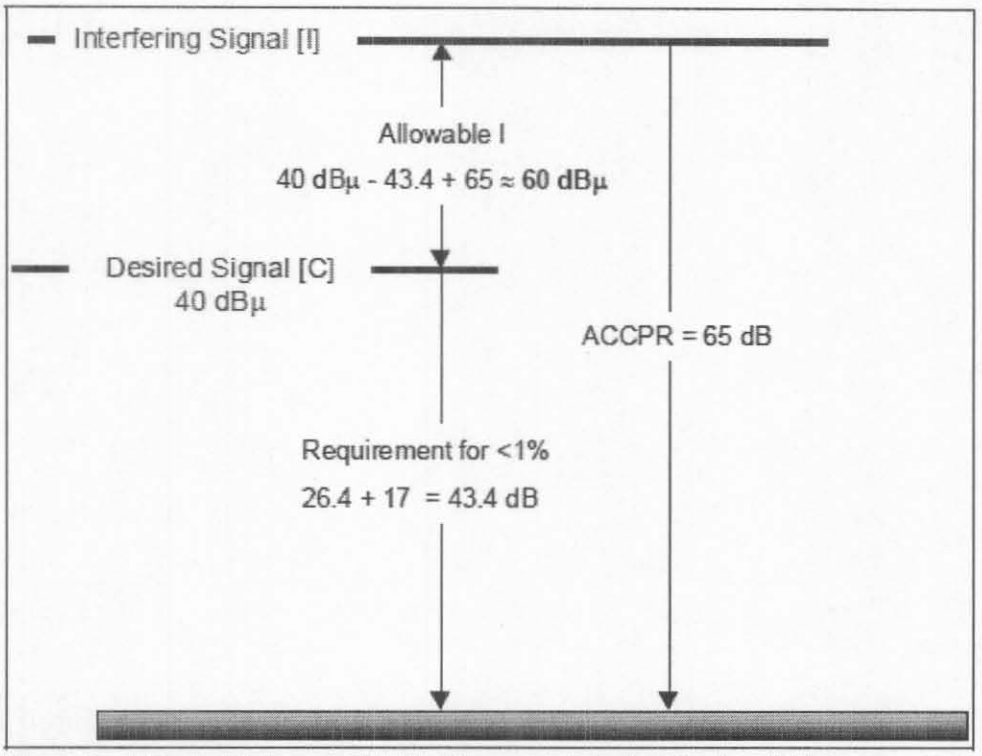

Figure 6 - Adjusted Adjacent 25 kHz Channel Interfering Contour Value

An adjacent Interfering (25 kHz) channel shall be allowed to have its 60 dBμ (50,50) contour touch but not overlap the 40 dBμ (50,50) contour of a system being evaluated. Evaluations should be made in both directions.

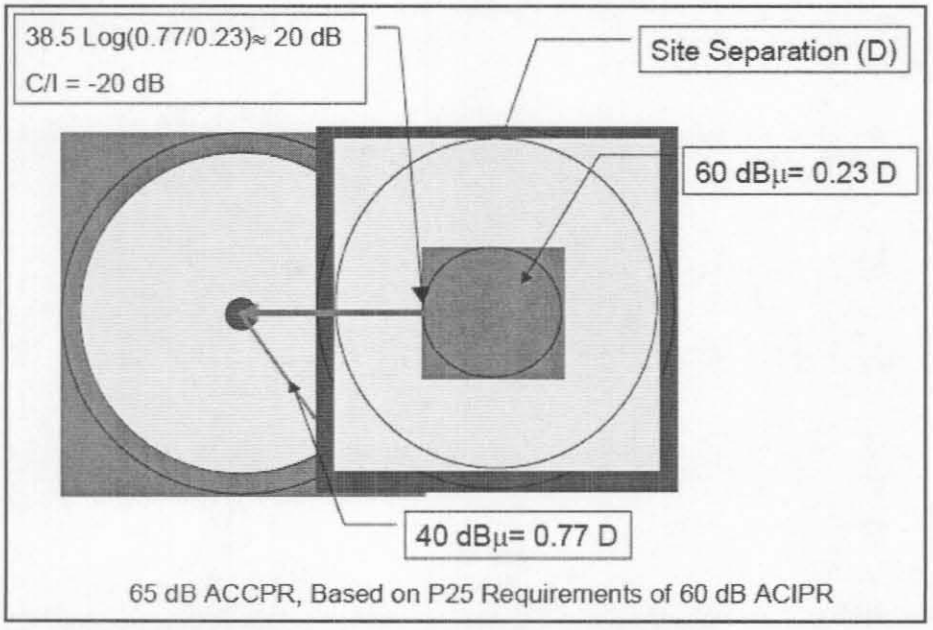

Figure 7 - Example Of Adjacent/Alternate Overlap Criterion

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This simple method is only adequate for presorting large blocks to potential entities. A more detailed analysis should be executed in the actual design phase to take all the issues into consideration. Additional factors that should be considered include:

- Degree of Service Area Overlap
- Different size of Service Areas
- Different ERP's and HAAT's
- Actual Terrain and Land Usage
- Differing User Reliability Requirements
- Migration from Project 25 Phase 1 to Phase 2
- Actual ACCP
- Balanced Systems
- Mobiles vs. Portables
- Use of voting
- Use of simulcast
- Radio specifications
- Simplex Operation
- Future unidentified requirements.

Special attention needs to be paid to the use of simplex operation. In this case, an interferer can be on an offset adjacent channel and in extremely close proximity to the victim receiver. This is especially critical in public safety where simplex operations are frequently used at a fire scene or during police operation. This type operation is also quite common in the lower frequency bands. In those cases, evaluation of base-to-base as well as mobile-to-mobile interference should be considered and evaluated.

Carrier to Interference Requirements

There are two different ways that interference is considered.

- Co Channel
- Adjacent and Alternate Channels

Both involve using a C/I ratio. The C/I ratio requires a probability be assigned. For example, a 10% Interference is specified; the C/I implies 90% probability of successfully achieving the desired ratio. At 1% interference, means that there is a 99% probability of achieving the desired C/I.

$$\frac{C}{I}\% = \frac{1}{2} \bullet erfc\left(\frac{\frac{C}{I}\text{margin}}{2\sigma}\right)$$

This can also be written in a form using the standard deviate unit (Z). In this case the Z for the desired probability of achieving the C/I is entered. For example, for a 90% probability of achieving the necessary C/I, $Z = 1.28$.

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$$\frac{C}{I}\% = Z \cdot \sqrt{2} \cdot \sigma$$

The most common requirements for several typical lognormal standard deviations (σ) are included in the following table based on Equation (2).

Location Standard Deviation (σ) dB	5.6	6.5	8	10
Probability %				
10%	10.14 dB	11.77 dB	14.48 dB	18.10 dB
5%	13.07 dB	15.17 dB	18.67 dB	23.33 dB
4%	13.86 dB	16.09 dB	19.81 dB	24.76 dB
3%	14.90 dB	17.29 dB	21.28 dB	26.20 dB
2%	16.27 dB	18.88 dB	23.24 dB	29.04 dB
1%	18.45 dB	21.42 dB	26.36 dB	32.95 dB

Table A1 - Probability Of Not Achieving C/I For Various Location Lognormal Standard Deviations

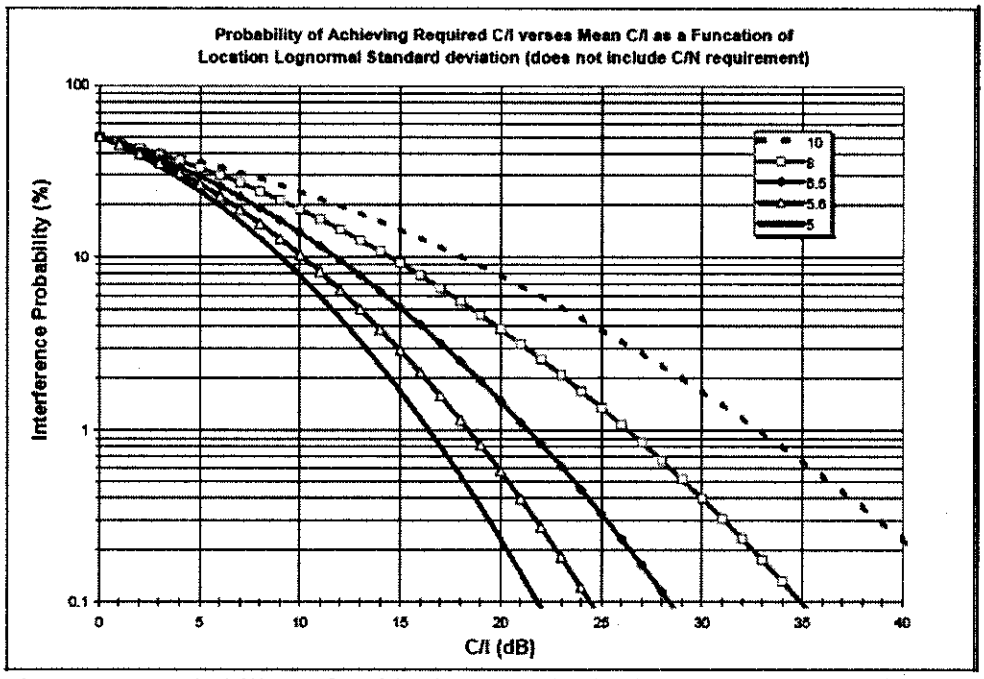

Figure A1, Probability Of Achieving Required C/I As A Function Of Location Standard Deviation

For co-channel the margin needs to include the "capture" requirement. When this is done, then a 1% probability of co channel interference can be rephrased to mean, there is a 99% probability that the "capture ratio" will be achieved. The capture ratio varies with the type of modulation. Older analog equipment has a capture ratio of approximately 7 dB. Project 25 FDMA is specified at 9 dB. Figure A1 shows the C/I requirement without including the capture requirement.

The 8 dB values for lognormal location standard deviation is reasonable when little information is available. Later when a detailed design is required, additional details and high-resolution terrain and land usage databases will allow a lower value to be used. The

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TIA recommended value is 5.6 dB. This provides the additional flexibility necessary to complete the design.

To determine the desired probability that both the C/N and C/I will be achieved requires that a joint probability be determined. Figure A2 shows the effects of a family of various levels of C/N reliability and the joint probability (Y-axis) in the presence of various probabilities of Interference. Note that at 99% reliability with 1% interference (X-axis) that the reduction is nearly the difference. This is because the very high noise reliability is degraded by the interference, as there is little probability that the noise criterion will not be satisfied. At 90%, the 1% interference has a greater likelihood that it will occur simultaneously when the noise criterion not being met, resulting is a less degradation of the 90%.

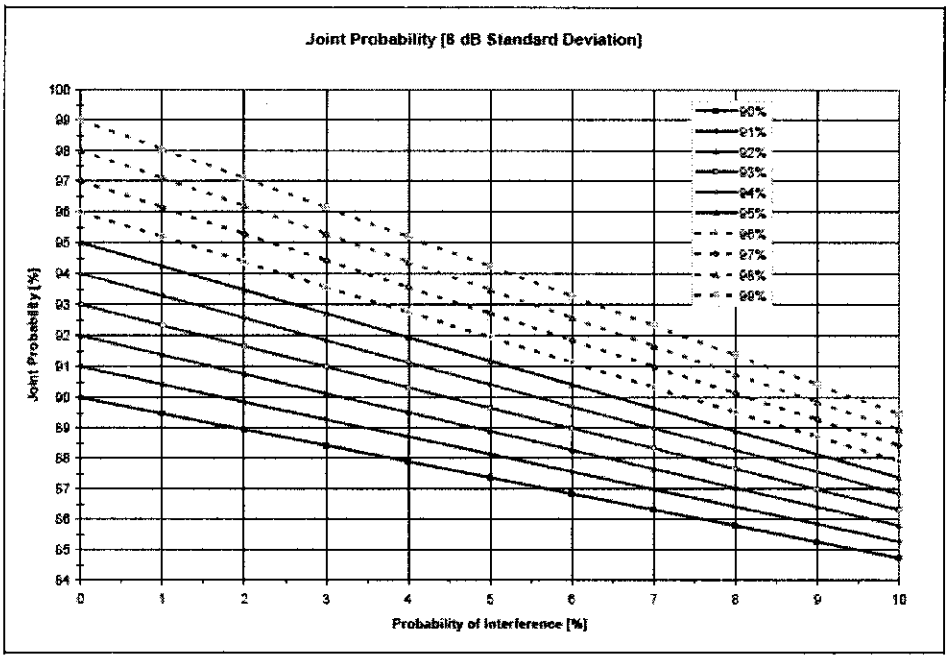

Figure A2 - Effect Of Joint Probability On The Composite Probability

For adjacent and alternate channels, the channel performance requirement must be added to the C/I ratio. When this is applied, then a 1% probability of adjacent/alternate channel interference can be rephrased to mean, there is a 99% probability that the "channel performance ratio" will be achieved.

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DTV Transition
Frequency Availability through the DTV Transition

DTV transition continues to be a topic discussed across the country. Region 16 is fortunate to be relatively unencumbered with regard to primary 700 MHz licensee broadcasters operating high power analog TV stations. Currently, K64BS Channel 64 operates in the City of Concordia in Cloud County, K66CD has a station in the City of Phillipsburg in Phillips County, K69DB is operational in the City of Hoxie in Sheridan County, and in the City of Pittsburg has a new station broadcasting on channel 69.

4.1.1.1.1 On August 14, 1996, the FCC released a* Sixth Further Notice of Proposed Rule Making *in the digital television (DTV) proceeding. A portion of the spectrum recovered from TV channels 60-69 when DTV is fully deployed "could be used to meet public safety needs."[3] By Congressional direction in the Balanced Budget Act of 1997, the FCC reallocated 24 MHz of spectrum to Public Safety services in the 764-776 MHz and 794-806 MHz bands. The statute required the FCC to establish service rules, by September 30, 1998, in order to start the process of assigning licenses. The rules that the FCC established by September 30, 1998, "provided the minimum technical framework necessary to standardize operations in this spectrum band, including, but not limited to: (a) establishing interference limits at the boundaries of the spectrum block and service areas; (b) establishing technical restrictions necessary to protect full-service analog and digital television service during the transition to digital television services; (c) permitting public safety licensees the flexibility to aggregate multiple licenses to create larger spectrum blocks and service areas, and to disaggregate or partition licenses to create smaller spectrum blocks or service areas; and (d) ensuring that the new spectrum will not be subject to harmful interference from television broadcast licensees" [4].

[3] Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service, MM Docket No. 87-268, *Sixth Further Notice of Proposed Rule Making*, 11 FCC Rcd 10,968, 10,980 (1996) (*DTV Sixth Notice*).

4 FCC 98-191, 1st R&O and 3rd NPRM on WT Docket No. 96-86 Operational & Technical Requirements or the 700 MHz Public Safety Band,
para.4.

In April 1997, the FCC assigned a second 6 MHz block of spectrum to each license (or permit to construct) holders of full power, analog, television broadcast station (NTSC) in order to construct a digital television station (DTV). Secondary low power television stations (LPTV), secondary translators and boosters (TX), mutually exclusive applications for new stations, and application filed after a cut-off date did not receive a second 6 MHz allotment for DTV. The FCC established about a 10 year timeline for those stations with a DTV assignment to construct a DTV station, cease NTSC transmissions, and return one of the two 6 MHz blocks of spectrum to the FCC. Target date for the end of analog television (NTSC) transmission was set for December 31, 2006.

Congress provided several market penetration loopholes (>85% households served, all 4 major networks converted, etc) allowing NTSC operations to continue past the December 31, 2006 date. While there are over 100 NTSC full power stations in this band, there are also about 12 DTV assignments. The DTV assignments might continue operations past the December 31, 2006 date for two reasons. 1) They must find a suitable channel below channel 60 to move to, which may be their own NTSC assignment. They may not be able to find another allocation until other NTSC stations

have ceased operations and returned a channel below 60 to the FCC. Or, 2) their license does not expire until after 2006 (most are licensed into 2007 or 2008).

Protection of Public Safety from future TV/DTV Stations

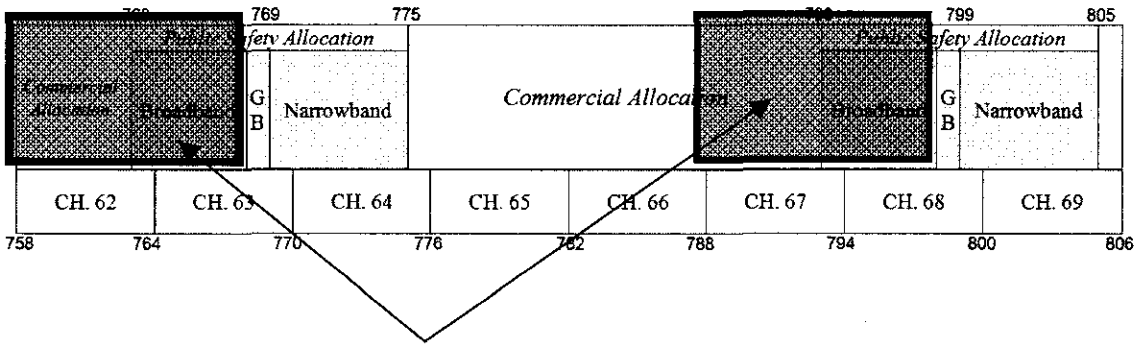
Public safety base and mobile operations must have a safe distance between the co-channel or adjacent TV and DTV systems. This typically means that a co-channel and adjacent channel base and mobile system cannot operate in areas where TV stations already exist. The public safety systems that will operate in the 700 MHz band for some locations in the U.S. and its possessions must wait until the transition period is over and the TV/DTV stations have moved to other channels before beginning operations. In other areas, channels will be available for public safety operations. During the transition period, public safety stations must be acutely aware of the TV allocations for both TV and DTV stations. The FCC wants the number of situations where the public safety licensee has to coordinate its station with the existing TV stations kept to a minimum. The Commission's decisions in the reallocation of spectrum to DTV implemented two requirements, which will help public safety systems to protect TV/DTV stations and reduce the number of coordination's. The first requirement is that full power UHF-TV stations can no longer apply for channels 60-69 or modifications in channels 60-69, which would increase the stations' service areas, which creates a known environment for public safety licensees. The second requirement is that since only existing TV station licensees can apply for DTV channels, the applicants and their proposed locations are already known.

Also, the low power TV stations and translators already on channels 60-69 are secondary and must cease operations if they cause harmful interference when a primary service, like land mobile, comes into operation. The secondary Low Power TV stations already on channels 60-69 cannot apply for the new Class A protection status.

Spectrum Overview

700 MHz Public Safety Band - 24 megahertz of spectrum

FIGURE 2: REVISED 700 MHZ BAND PLAN FOR PUBLIC SAFETY SERVICES



APPENDIX J

NCC / NPSTC Standard Channel Nomenclature for the Public Safety Interoperability Channels

Table 2: Sorted by band in Frequency or Channel Order

The FCC designated 764-776 MHz (TV Channels 63 and 64) for base-to-mobile transmissions and 794-806 MHz (TV Channels 68 and 69) for mobile-to-base communications. In addition, base transmit channels in TV Channel 63 are paired with mobile channels in TV Channel 68 and likewise that base channels in TV Channel 64 are paired with mobile channels in TV Channel 69. This provides 30 MHz separations between base and mobile transmit channel center frequencies. This band plan was suggested because of the close proximity of TV Channels 68 and 69 to the 806-824 MHz band, which already contains the transmit channels for mobile and portable radios (base receive).

Mobile transmissions are allowed on any part of the 700 MHz band, not just the upper 12 MHz. This will facilitate direct mobile-to-mobile communications (*i.e.*, not through a repeater) that are often employed at the site of an incident, where wide area communications facilities are not available or desired. Allowing mobile transmissions on both halves of a paired channel is generally consistent with FCC rules governing use of other public safety bands.

Non-uniform TV Channel Pairing

There are currently geographical areas where, either licensed or otherwise protected full-service analog or new digital, television stations are currently authorized to operate on TV Channels 62, 63, 64, 65, 67, 68, and 69. During the DTV transition period, an incumbent TV station occupying one or more of the four Public Safety channels (63, 64, 68, 69) or the three adjacent channels (62, 65, 67) may preclude pairing of the channels in accordance with the band plan defined above. Therefore, to provide for cases where standard pairing is not practicable during the DTV transition period, the FCC will allow the RPCs to consider pairing base-to-mobile channels in TV Channel 63 with mobile-to-base channels in TV Channel 69 and/or base-to-mobile channels in TV Channel 64 with mobile-to-base channels in TV Channel 68. Because such non-standard channel pairing may cause problems when the band becomes more fully occupied, the FCC expects the RPCs to permit such non-standard channel pairing only when absolutely necessary, and the FCC may require stations to return to standard channel pairing after the DTV transition period is over. However, the FCC will not permit non-standard channel pairing on the nationwide interoperability channels in the 700 MHz band because of the need for nationwide uniformity of these channels.

At least three issues must be considered before deciding upon non-uniform channel pairing:

1) Preliminary analysis, looking at current incumbent TV stations, shows few geographic areas where non-uniform pairing allows early implementation of 700 MHz systems. As DTV Transition progresses, and TV stations vacate the band, this situation might change.

2) If interoperability channels must be uniform, operation on I/O channels will be blocked until all incumbent TV stations are cleared, even though General Use channels may be implemented earlier.

3) If I/O channels must follow uniform pairing, and general use & reserve channels can be implemented using non-uniform pairing, narrowband voice subscriber equipment must operate on 3 different channel pairings - 39 MHz (764-767 paired with 803-806 MHz), 30 MHz, and 21 MHz (773-776 paired with 794-797 MHz). No vendors have volunteered to build equipment & systems for non-uniform pairing, yet.

TV/DTV Protection

During the DTV Transition period, public safety must consider all co-channel and adjacent channel TV and DTV stations within about a 160 mile radius. For public safety channel pair 63/68, public safety must consider six TV/DTV channels - co channels 63 and 68, as well as, adjacent channels 62, 64, 67, and 69.

For public safety channel pair 64/69, public safety must consider five TV/DTV channels, co-channels 64 and 69, as well as adjacent channels 63, 65, and 68.

It may only take one TV/DTV station to block operations on one, the other, or both public safety channel pairs. For a public safety system at 500 watts ERP and 500 ft HAAT, co-channel TV stations can block a 120 mile radius and adjacent channel TV/DTV stations can block a 90 mile radius.

Since base stations transmitters are located only on channels 63 and 64, LMR mobile only TV/DTV protection spacing on channels 68 and 69 may be shorter than LMR base TV/DTV protection on channels 63 & 64.

TV/DTV Protection Criteria

Public safety applicants can select one of three ways to meet the TV/DTV protection requirements: (1) utilize the geographic separation specified in the 40 dB Tables of 90.309; (2) submit an engineering study to justify other separations which the Commission approves; or (3) obtain concurrence from the applicable TV/DTV station(s).

90.309 40 dB D/U Tables

The FCC adopted a 40 dB desired (TV/DTV) to undesired (LMR) signal ratio for co-channel operations and a 0 dB desired/undesired (D/U) signal ratio for adjacent channel operations. The D/U ratio is used to determine the geographic separation needed between public safety base stations and the Grade B service contours of co-channel and adjacent channel TV/DTV stations. The D/U signal ratio is used to determine the level of land mobile signals that can be permitted at protected fringe area TV receiver locations without degrading the TV picture to less than a defined picture quality. In other words, the D/U signal ratio indicates what relative levels of TV and land mobile signals can be tolerated without causing excessive interference to TV reception at the fringe of the TV service area.

Desired and undesired contours are not quite the same thing. Desired analog TV contours are defined as F(50,50), meaning coverage is 50% of the places and 50% of the time. Undesired land mobile or interference contours are defined as F(50,10). For Digital TV,

the desired contours are defined as F(50,90), while the undesired land mobile contour are still F(50,10).

Land mobile and analog TV services have successfully shared the 470-512 MHz band. (TV Channels 14-20) within a 50 mile radius of eleven major cities since the early 1970's based upon providing a signal ratio of at least 50 dB between the desired TV signal and undesired co-channel land mobile signal (D/U signal ratio) at a hypothetical 88.5 km (55 mi) Grade B service contour and an adjacent channel D/U signal ratio of 0 dB at the same hypothetical Grade B service contour. These separation distances also protected the land mobile systems from interference from the TV stations. In 1985, recognizing that 50 dB D/U was too conservative, the FCC proposed to expand land mobile/TV sharing to other TV channels and proposed that the geographic separation requirements for co-channel operations be based on a D/U signal ratio of 40 dB rather than 50 dB. That proceeding was put on hold pending completion of the DTV proceeding, which has now been completed. In the 470-512 MHz band, the FCC also relied on minimum separation distances based on the various heights and powers of the land mobile stations (HAAT/ERP separation tables) to prevent harmful interference.

Since this simple, yet conservative, method was successful, the FCC decided to use this same method, the 90.309 HAAT/ERP Separation Tables, to administer LMR to TV/DTV receiver protection criteria for the services in the 700 MHz band.

Co-channel land mobile base station transmitters are limited to a maximum signal strength at the hypothetical TV Grade B contour 40 dB D/U below desired 64 dBu F(50,50) analog TV signal level, or 24 dBu F(50,10). The FCC adopted a 0 dB D/U signal ratio for adjacent channel operations. Adjacent channel land mobile transmitters will be limited to a maximum signal of 64 dBu F(50,10) which is 0 dB D/U below the TV Grade B signal of 64 dBu F(50,50) at the TV station Grade B contour of 88.5 km (55 miles). A typical TV receiver's adjacent channel rejection is at least 10-20 dB greater than this level, which will further safeguards TV receivers from land mobile interference.

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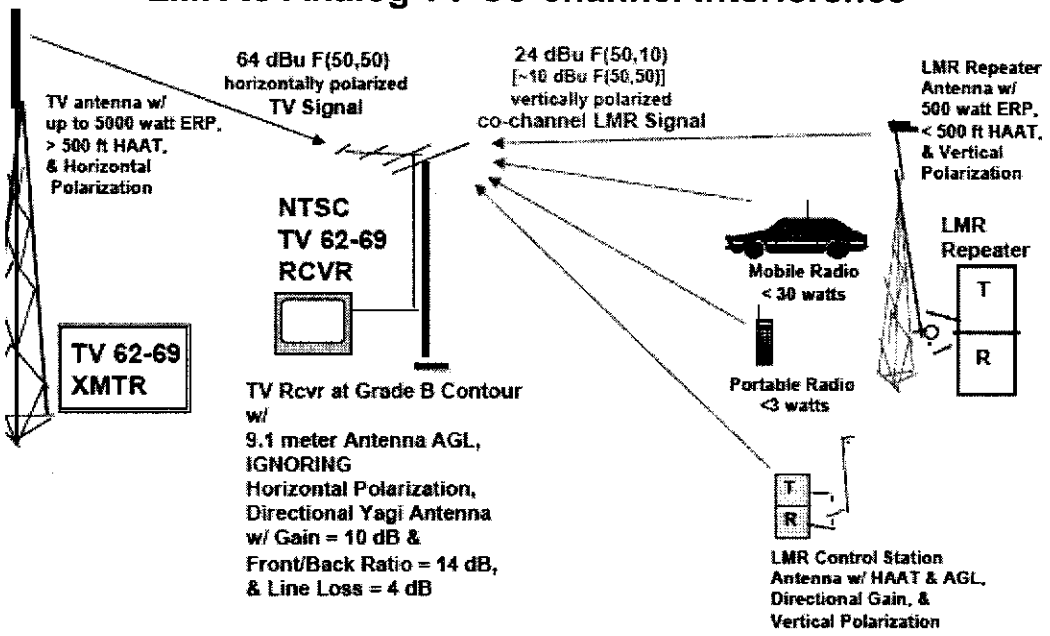
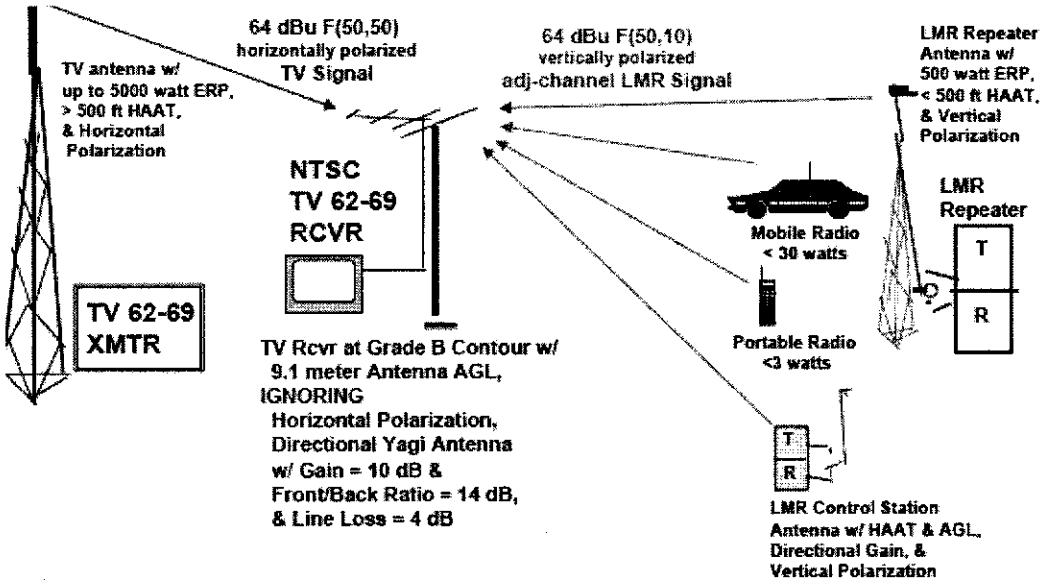
NCC / NPSTC Standard Channel Nomenclature for the Public Safety Interoperability Channels

Table 2: Sorted by band in Frequency or Channel Order

LMR to Analog TV Co-channel Interference



LMR to Analog TV Adj-channel Interference



The equivalent ratios for a DTV station's 41 dB F(50,90) desired field strength contour are land mobile 17 dB F(50,10) contour for co-channel and land mobile - 23 dB F(50,10) contour for adjacent channel.

The Tables to protect TV/DTV stations are found in Section 90.309 of the Commission's rules. These existing Tables cover co-channel protection based on a 40 dB D/U ratio

using the separation methods described in Section 73.611 of the Commission's rules for base, control, and mobile stations, and for adjacent channel stations for base stations based on a 0 dB D/U ratio

.

However, the original considerations in 470-512 MHz band under Section 90.309 were different in that mobiles were limited in their roaming distance from the base station (less than 30 miles) and mobiles were on the same TV channel as the base station.

Control and mobile stations (including portables) are limited in height (200 ft for control stations, 20 ft for mobiles/portables) and power (200 watts ERP for control stations, 30 watts for mobiles, 3 watts for portables). Mobiles and control stations shall afford protection to co-channel and adjacent channel TV/DTV stations in accordance with the values specified in Table D (co-channel frequencies based on 40 dB protection for TV and 17 dB for DTV) in § 90.309.

Control stations and mobiles/portables shall keep a minimum distance of 8 kilometers (5 miles) from all adjacent channel TV/DTV station hypothetical or equivalent Grade B contours (adjacent channel frequencies based on 0 dB protection for TV and -23 dB for DTV). This means that control and mobile stations shall keep a minimum distance of 96.5 kilometers (60 miles) from all adjacent channel TV/DTV stations.

Since operators of mobiles and portables are able to move and communicate with each other, licensees or coordinators must determine the areas where the mobiles can and cannot roam in order to protect the TV/DTV stations, and advise the mobile operators of these areas and their restrictions.

Engineering Analysis

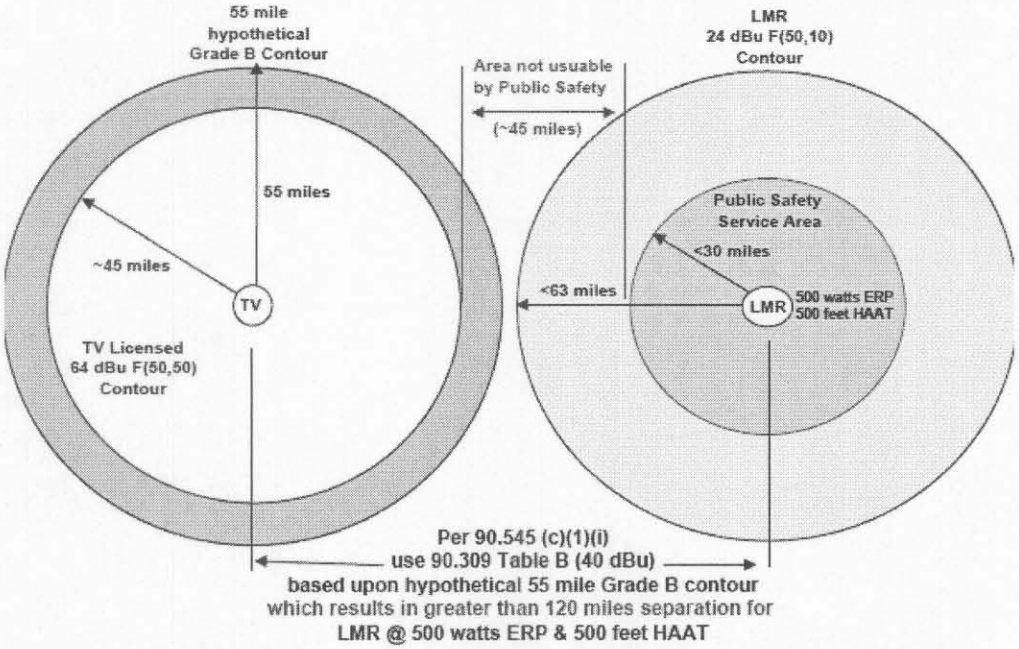
Limiting TV/land mobile separation to distances specified in the 40 dB HAAT/ERP Separation Tables found in 90.309 may prevent public safety entities from fully utilizing this spectrum in a number of major metropolitan areas until after the DTV transition period ends. Public safety applicants will be allowed to submit engineering studies showing how they propose to meet the appropriate D/U signal ratio at the existing TV station's authorized or applied for Grade B service contour or equivalent contour for DTV stations instead of the hypothetical contour at 88.5 km.

APPENDIX J

NCC / NPSTC Standard Channel Nomenclature for the Public Safety Interoperability Channels

Table 2: Sorted by band in Frequency or Channel Order

700 MHz Band - LMR to Co-Channel TV Spacing using 40 dBu Table



Many Channel 60-69 TV stations do not have 55 mile radius Grade B contours.
Average calculated for NE corridor is less than 45 miles.

This would permit public safety applicants to take into account intervening terrain and engineering techniques such as directional and down-tilt antennas in determining the necessary separation to provide the required protection. Public safety applicants who use the engineering techniques must consider the actual TV/DTV parameters and not base their study on the 88.5 km hypothetical or equivalent Grade B contour. If land mobile interference contour does not overlap the TV Grade B contour (or DTV equivalent), then engineering analysis may be submitted to the FCC with the application.

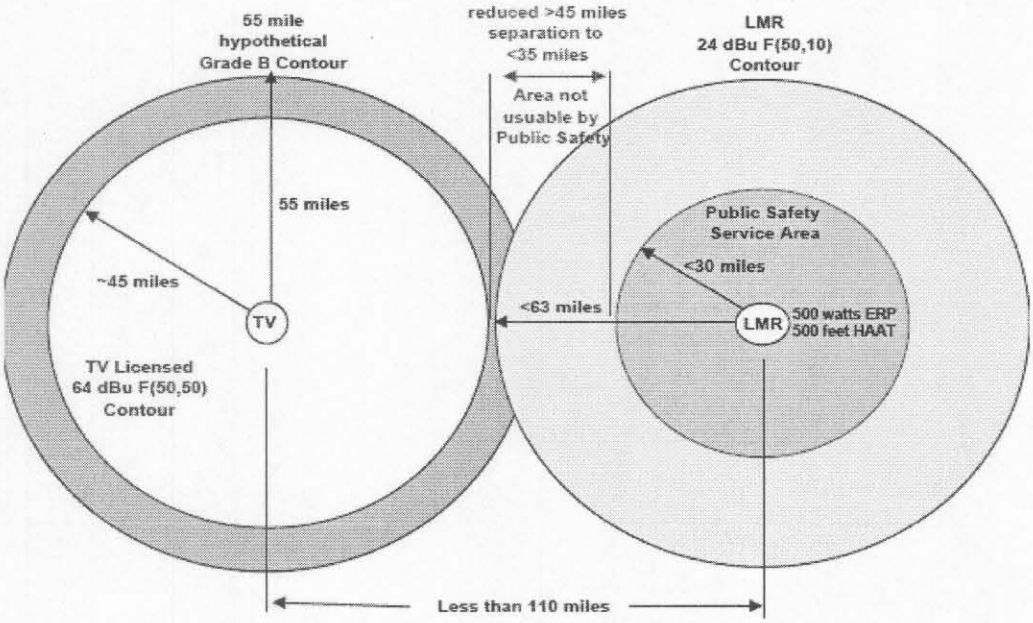
APPENDIX J

NCC / NPSTC Standard Channel Nomenclature for the Public Safety Interoperability Channels

Table 2: Sorted by band in Frequency or Channel Order

700 MHz Band - Public Safety to Co-Channel TV Spacing using Engineering Analysis per 90.545(c)(1)(ii)

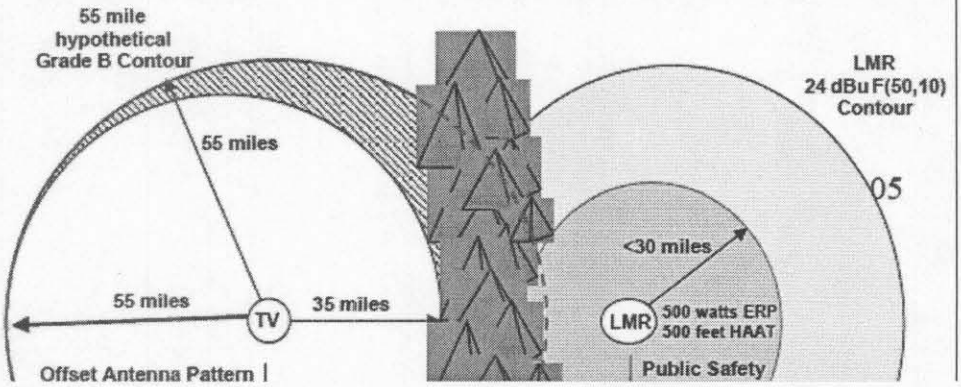
Actual LMR 24 dBu contour just touches Licensed TV/DTV 64 dBu contour



This method is most useful with lower power TV stations whose Grade B contours are much smaller than the hypothetical 55 mile (88.5 km) Grade B contour or have directional patterns. Note that 200 ft AGL limitations on 700 MHz control stations is much higher than the 100 ft AGL limitation used at UHF. Limiting control station antenna height and/or ERP may greatly reduce land mobile to TV contour spacing.

700 MHz Band - Public Safety to Co-Channel TV Spacing using Engineering Analysis per 90.545(c)(1)(ii)

Actual LMR 24 dBu contour just touches Actual TV/DTV 64dBu contour



Also, note that analysis for TV/DTV receivers uses 30 ft (10 m) antenna height whereas, analysis for land mobile subscribers uses about a 6 ft (2m) antenna height.

TV/DTV Short-spacing

Public safety applicants will also be allowed to "short-space" even closer if they get the (written) approval of the TV stations they are required to protect. Public safety applicants need to determine the station's intended market area vs its hypothetical Grade B contour area. Alternately, the TV/DTV station may be short spaced against another TV/DTV station, limiting their area of operation, but does not affect LMR operations.

Instead of each agency negotiating with a TV/DTV station individually, they may want to combine into a single group or committee and negotiate together.

TV/DTV Height Adjustment Factor

In order to protect certain TV/DTV stations which have extremely large contours due to unusual height situations, such as a television station mounted on top of Mount Wilson near Los Angeles, California, the FCC incorporated an additional height adjustment factor which must be used by all public safety base, control and mobile stations to protect these few TV/DTV stations and afford the land mobile stations the necessary protection from the TV/DTV stations. The equation necessary to calculate the additional distance from the hypothetical or equivalent Grade B contour is found in the rules section 90.545(c)(2)(iii).

APPENDIX K

NCC / NPSTC Standard Channel Nomenclature for the Public Safety Interoperability Channels

Table 2: Sorted by band in Frequency or Channel Order

Table of Interoperability Channels
For Specific Uses/Services

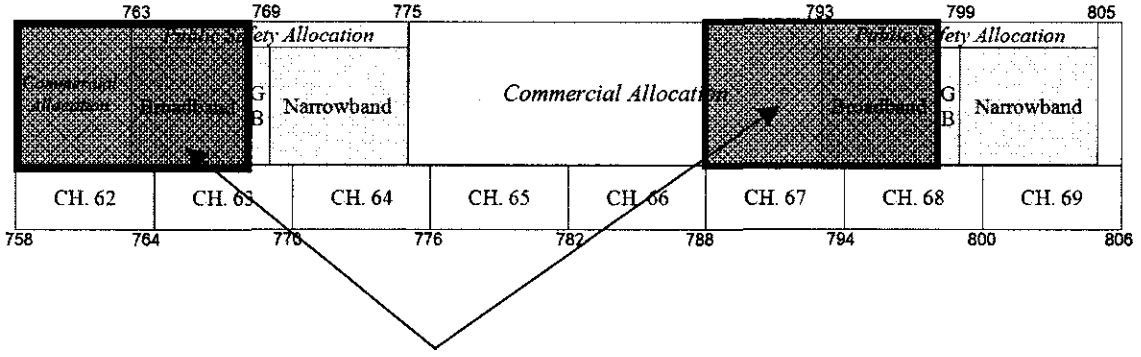
NOTE: The interoperability nomenclature identified on the following pages is for reference only pending finalization of channel labeling recommendations currently before the FCC. These recommendations originated from the National Coordination Committee (NCC) interoperability Subcommittee, asking for standardized channel nomenclature and labeling. The Federal Communications Commission's decisions on channel labeling can alter these values accordingly.

The National Public Safety Telecommunications Council (NPSTC) adopted this Standard Channel Nomenclature for the Public Safety Interoperability Channels in a report entitled, **"NCC / NPSTC Standard Channel Nomenclature for the Public Safety Interoperability Channels"** published originally in July 2003 and later revised in June 2007. The text of the full report may be found at: http://www.npstc.org/documents/IO-0060B-20070612%20Standard%20Channel%20Nomenclature%20Final.pdf

Table 2 of that report which includes the 700 MHz Interoperability Channels is included in entirety on the following pages of Appendix K.

The diagram below labeled Figure 2 is an overview of the FCC revised 700 MHz Band Plan as approved in the Second Order and Report on July 31, 2007.

FIGURE 2: REVISED 700 MHZ BAND PLAN FOR PUBLIC SAFETY SERVICES



APPENDIX K

NCC / NPSTC Standard Channel Nomenclature for the Public Safety Interoperability Channels

Table 2: Sorted by band in Frequency or Channel Order

FREQ / FCC CHANNEL (SUBSCRIBER LOAD)		BASE,MOBILE, OR FIXED (REPEATER OR CONTROL)	ELIGIBILITY / PRIMARY USE	COMMON NAME	LIMITATIONS (47 CFR Part 90)
RECEIVE	TRANSMIT				
MHz	MHz	FCC 30 MHz Public Safety Band			
39.4600	SIMPLEX	Base-Fixed-Mobile	Law Enforcement	LLAW1	90.20(c)(3) [15]
39.4800	*SIMPLEX*	*Base-Fixed-Mobile*	*Fire Proposed*	*LFIRE2*	*Prop. 90.20(c)(3) [19]*
45.8600	SIMPLEX	Base-Fixed-Mobile	Law Enforcement	LLAW3	90.20(c)(3) [15]
45.8800	SIMPLEX	Base-Fixed-Mobile	Fire	LFIRE4	90.20(c)(3) [19]
MHz	MHz	FCC 150 - 162 MHz Public Safety Band			
151.1375	SIMPLEX	Base-Fixed-Mobile	Any Public Safety Eligible	VTAC11	90.20(c)(3) [80]
154.2650	SIMPLEX	Base-Fixed-Mobile	Fire	VFIRE22	90.20(c)(3) [19]
154.2725	SIMPLEX	Base-Fixed-Mobile	Fire	VFIRE24	90.20(c)(3) [19]
154.2800	SIMPLEX	Base-Fixed-Mobile	Fire	VFIRE21	90.20(c)(3) [19]
154.2875	SIMPLEX	Base-Fixed-Mobile	Fire	VFIRE25	90.20(c)(3) [19]
154.2950	SIMPLEX	Base-Fixed-Mobile	Fire	VFIRE23	90.20(c)(3) [19]
154.3025	SIMPLEX	Base-Fixed-Mobile	Fire	VFIRE26	90.20(c)(3) [19]
154.4525	SIMPLEX	Base-Fixed-Mobile	Any Public Safety Eligible	VTAC12	90.20(c)(3) [80]
155.3400	SIMPLEX	Base-Fixed-Mobile	EMS	VMED28	90.20(c)(3) [40]
155.3475	SIMPLEX	Base-Fixed-Mobile	EMS	VMED29	90.20(c)(3) [40]
155.4750	SIMPLEX	Base-Fixed-Mobile	Law Enforcement	VLAW31	90.20(c)(3) [41]
155.4825	SIMPLEX	Base-Fixed-Mobile	Law Enforcement	VLAW32	90.20(c)(3) [41]
155.7525	SIMPLEX	Base-Fixed-Mobile	Any Public Safety Eligible	VCALL10	90.20(c)(3) [80,83]
158.7375	SIMPLEX	Base-Fixed-Mobile	Any Public Safety Eligible	VTAC13	90.20(c)(3) [80]
159.4725	SIMPLEX	Base-Fixed-Mobile	Any Public Safety Eligible	VTAC14	90.20(c)(3) [80]
161.8500	157.2500	Mobile-Fixed	Allocated for Public Safety Use in 33 Inland VPCAs/EAs	VTAC17	90.20(g)
	SIMPLEX	Base-Fixed-Mobile		VTAC17D	
161.8250	157.2250	Mobile-Fixed	Allocated for Public Safety Use in 33 Inland VPCAs/EAs	VTAC18	90.20(g)
	SIMPLEX	Base-Fixed-Mobile		VTAC18D	
161.8750	157.2750	Mobile-Fixed	Allocated for Public Safety Use in 33 Inland VPCAs/EAs	VTAC19	90.20(g)
	SIMPLEX	Base-Fixed-Mobile		VTAC19D	
MHz	MHz	NTIA VHF Law Enforcement Channels			
MHz	MHz	NTIA VHF Incident Response Channels			
Use of the NTIA Interoperability Channels by FCC licensees is subject to the conditions specified in FCC Public Notice DA 01-1621. There are discrepencies between DA 01-1621 and the current NTIA "Red Book." NPSTC is working with our Federal partners to clarify the discrepancies and develop a revised name plan for the NTIA channels.					
MHz	MHz	NTIA UHF Law Enforcement Channels			
MHz	MHz	NTIA UHF Incident Response Channels			
Use of the NTIA Interoperability Channels by FCC licensees is subject to the conditions specified in FCC Public Notice DA 01-1621. There are discrepencies between DA 01-1621 and the current NTIA "Red Book." NPSTC is working with our Federal partners to clarify the discrepancies and develop a revised name plan for the NTIA channels.					
MHz	MHz	FCC 450 - 470 MHz Public Safety Band			
453.2125	458.2125	Mobile-Fixed	Any Public Safety Eligible	UCALL40	90.20(c)(3) [80,83]
	SIMPLEX	Base-Fixed-Mobile		UCALL40D	
453.4625	458.4625	Mobile-Fixed	Any Public Safety Eligible	UTAC41	90.20(c)(3) [80]
	SIMPLEX	Base-Fixed-Mobile		UTAC41D	
453.7125	458.7125	Mobile-Fixed	Any Public Safety Eligible	UTAC42	90.20(c)(3) [80]
	SIMPLEX	Base-Fixed-Mobile		UTAC42D	
453.8625	458.8625	Mobile-Fixed	Any Public Safety Eligible	UTAC43	90.20(c)(3) [80]
	SIMPLEX	Base-Fixed-Mobile		UTAC43D	
CHANNEL	CHANNEL	FCC 700 MHz Public Safety Band (TV 63 + 68)			
23-24	983-984	Mobile-Fixed	General Public Safety Service (secondary trunked)	7TAC51	90.531(a)(1)(iii)
	SIMPLEX	Base-Fixed-Mobile		7TAC51D	
39-40	999-1000	Mobile-Fixed	Calling Channel	7CALL50	90.531(a)(1)(ii)
	SIMPLEX	Base-Fixed-Mobile		7CALL50D	
63-64	1023-1024	Mobile-Fixed	EMS	7MED65	
	SIMPLEX	Base-Fixed-Mobile		7MED65D	
79-80	1039-1040	Mobile-Fixed	EMS	7MED66	
	SIMPLEX	Base-Fixed-Mobile		7MED66D	
103-104	1063-1064	Mobile-Fixed	General Public Safety Service (secondary trunked)	7TAC52	90.531(a)(1)(iii)
	SIMPLEX	Base-Fixed-Mobile		7TAC52D	
119-120	1079-1080	Mobile-Fixed	General Public Safety Service	7TAC55	
	SIMPLEX	Base-Fixed-Mobile		7TAC55D	
143-144	1103-1104	Mobile-Fixed	Fire	7FIRE63	
	SIMPLEX	Base-Fixed-Mobile		7FIRE63D	

APPENDIX K

FREQ / FCC CHANNEL (SUBSCRIBER LOAD)		BASE,MOBILE, OR FIXED (REPEATER OR CONTROL)	ELIGIBILITY / PRIMARY USE	COMMON NAME	LIMITATIONS (47 CFR Part 90)
RECEIVE	TRANSMIT				
CHANNEL	CHANNEL	FCC 700 MHz Public Safety Band (TV 63 + 68) *(Continued)*			
159-160	1119-1120	Mobile-Fixed	Fire	7FIRE64	
	SIMPLEX	Base-Fixed-Mobile		7FIRE64D	
183-184	1143-1144	Mobile-Fixed	General Public Safety Service (secondary trunked)	7TAC53	90.531(a)(1)(iii)
	SIMPLEX	Base-Fixed-Mobile		7TAC53D	
199-200	1159-1160	Mobile-Fixed	General Public Safety Service	7TAC56	
	SIMPLEX	Base-Fixed-Mobile		7TAC56D	
223-224	1183-1184	Mobile-Fixed	Law Enforcement	7LAW61	
	SIMPLEX	Base-Fixed-Mobile		7LAW61D	
239-240	1199-1200	Mobile-Fixed	Law Enforcement	7LAW62	
	SIMPLEX	Base-Fixed-Mobile		7LAW62D	
263-264	1223-1224	Mobile-Fixed	General Public Safety Service (secondary trunked)	7TAC54	90.531(a)(1)(iii)
	SIMPLEX	Base-Fixed-Mobile		7TAC54D	
279-280	1239-1240	Mobile-Fixed	Mobile Data	7DATA69	90.531(a)(1)(i)
	SIMPLEX	Base-Fixed-Mobile		7DATA69D	
303-304	1263-1264	Mobile-Fixed	Mobile Repeater	7MOB59	
	SIMPLEX	Base-Fixed-Mobile		7MOB59D	
319-320	1279-1280	Mobile-Fixed	Other Public Service	7GTAC57	
	SIMPLEX	Base-Fixed-Mobile		7GTAC57D	
CHANNEL	CHANNEL	FCC 700 MHz Public Safety Band (TV 64 + 69)			
641-642	1601-1602	Mobile-Fixed	EMS	7MED86	
	SIMPLEX	Base-Fixed-Mobile		7MED86D	
657-658	1617-1618	Mobile-Fixed	General Public Safety Service (secondary trunked)	7TAC71	90.531(a)(1)(iii)
	SIMPLEX	Base-Fixed-Mobile		7TAC71D	
681-682	1641-1642	Mobile-Fixed	Calling Channel	7CALL70	90.531(a)(1)(ii)
	SIMPLEX	Base-Fixed-Mobile		7CALL70D	
697-698	1657-1658	Mobile-Fixed	EMS	7MED87	
	SIMPLEX	Base-Fixed-Mobile		7MED87D	
721-722	1681-1682	Mobile-Fixed	Fire	7FIRE83	
	SIMPLEX	Base-Fixed-Mobile		7FIRE83D	
737-738	1697-1698	Mobile-Fixed	General Public Safety Service (secondary trunked)	7TAC72	90.531(a)(1)(iii)
	SIMPLEX	Base-Fixed-Mobile		7TAC72D	
761-762	1721-1722	Mobile-Fixed	General Public Safety Service	7TAC75	
	SIMPLEX	Base-Fixed-Mobile		7TAC75D	
777-778	1737-1738	Mobile-Fixed	Fire	7FIRE84	
	SIMPLEX	Base-Fixed-Mobile		7FIRE84D	
801-802	1761-1762	Mobile-Fixed	Law Enforcement	7LAW81	
	SIMPLEX	Base-Fixed-Mobile		7LAW81D	
817-818	1777-1778	Mobile-Fixed	General Public Safety Service (secondary trunked)	7TAC73	90.531(a)(1)(iii)
	SIMPLEX	Base-Fixed-Mobile		7TAC73D	
841-842	1801-1802	Mobile-Fixed	General Public Safety Service	7TAC76	
	SIMPLEX	Base-Fixed-Mobile		7TAC76D	
857-858	1817-1818	Mobile-Fixed	Law Enforcement	7LAW82	
	SIMPLEX	Base-Fixed-Mobile		7LAW82D	
881-882	1841-1842	Mobile-Fixed	Mobile Repeater	7MOB79	
	SIMPLEX	Base-Fixed-Mobile		7MOB79D	
897-898	1857-1858	Mobile-Fixed	General Public Safety Service (secondary trunked)	7TAC74	90.531(a)(1)(iii)
	SIMPLEX	Base-Fixed-Mobile		7TAC74D	
921-922	1881-1882	Mobile-Fixed	Mobile Data	7DATA89	90.531(a)(1)(i)
	SIMPLEX	Base-Fixed-Mobile		7DATA89D	
937-938	1897-1898	Mobile-Fixed	Other Public Service	7GTAC77	
	SIMPLEX	Base-Fixed-Mobile		7GTAC77D	
MHz	MHz	FCC 800 MHz NPSPAC Band (Post-Rebanding)			
851.0125	806.0125	Mobile-Fixed	Any Public Safety Eligible	8CALL90	90.16
	SIMPLEX	Base-Fixed-Mobile		8CALL90D	
851.5125	806.5125	Mobile-Fixed	Any Public Safety Eligible	8TAC91	90.16
	SIMPLEX	Base-Fixed-Mobile		8TAC91D	
852.0125	807.0125	Mobile-Fixed	Any Public Safety Eligible	8TAC92	90.16
	SIMPLEX	Base-Fixed-Mobile		8TAC92D	
852.5125	807.5125	Mobile-Fixed	Any Public Safety Eligible	8TAC93	90.16
	SIMPLEX	Base-Fixed-Mobile		8TAC93D	
853.0125	808.0125	Mobile-Fixed	Any Public Safety Eligible	8TAC94	90.16
	SIMPLEX	Base-Fixed-Mobile		8TAC94D	

APPENDIX K

Project 25 Common Air Interface

Interoperability channel parameters
Certain common P25 parameters need to be defined to ensure digital radios operating on the 700 MHz Interoperability Channels can communicate. This is analogous to defining the common CTCSS tone used on NPSPAC analog Interoperability channels.

Network Access Code
In the Project 25 Common Air Interface definition, the Network Access Code is analogous to the use of CTCSS and CDCSS signals in analog radio systems. It is a code transmitted in the pre-amble of the P25 signal and repeated periodically throughout the transmission. Its purpose is to provide selective access to and maintain access to a receiver. It is also used to block nuisance and other co-channel signals. There are up to 4096 of these NAC codes. For ease of migration in other frequency bands, a NAC code table was developed which shows a mapping of CTCSS and CDCSS signals into corresponding NAC codes. Document TIA/EIA TSB102.BAAC contains NAC code table and other Project 25 Common Air Interface Reserve Values. Use of corresponding NAC code $293 is required for the 700 MHz Interoperability Channel NAC code.

Talk group ID
In the Project 25 Common Air Interface definition, the Talk group ID on conventional channels is analogous to the use of talk groups in trunking. In order to ensure that all users can communicate, all units should use a common Talk group ID.

Manufacturer's ID
The Project 25 Common Air Interface allows the ability to define manufacturer specific functions. In order to ensure that all users can communicate, all units should not use a specific Manufacturer's ID, but should use the default value of $00.

Message ID
The Project 25 Common Air Interface allows the ability to define specific message functions. In order to ensure that all users can communicate, all units should use the default Message ID for unencrypted messages of $00000000000000000000.

Encryption Algorithm ID and Key ID
The Project 25 Common Air Interface allows the ability to define specific encryption algorithms and encryption keys. In order to ensure that all users can communicate, encryption should not be used on the Interoperability Calling Channels, all units should use the default Algorithm ID for unencrypted messages of $80 and default Key ID for unencrypted messages 0000. These same defaults may be used for the other Interoperability channels when encryption is not used. Use of encryption is allowed on the other Interoperability channels. Regional Planning Committees need to define appropriate Message ID, Encryption Algorithm ID, and Encryption Key ID to be used in the encrypted mode on Interoperability channels.

APPENDIX L

Region 16 (Kansas) 700 MHz General Use Channel Assignment

Please be advised that Region 16 is relying upon the CAPRAD pre-coordination database tool for development of our plan. Because the CAPRAD database which will reflect the newly consolidated narrowband frequency and channel sort has yet to be restructured, Appendix L, which contains the frequency tables of the revised Region 16 plan has not been updated. This section will be amended upon completion of the CAPRAD channel sort.

APPENDIX M

Region 16 (Kansas)
Memorandum of Understanding

SUBJECT: Memorandum of Understanding for agencies to operate FCC designated 700 MHz Interoperability channels

This memorandum of understanding (hereafter referred to as MOU) shall be submitted by _____ (hereafter referred to as APPLICANT) representing a public safety agency indicating compliance and agreement with the attached operational and technical guidelines for the use of the FCC designated 700MHz Interoperability Channels. By virtue of signing and submitting this MOU, APPLICANT affirms its willingness to comply with the proper operation of the interoperability channels.

The APPLICANT shall abide by the conditions of this MOU, which are as follows:

- To operate by all applicable Federal, State, County, and City laws/ordinances.
- To utilize "plain language" for all transmissions.
- To monitor the Calling Channel(s) at an incident and coordinate the use of the tactical channels.
- To identify inappropriate use and mitigate the same from occurring in the future.
- To mitigate contention for channels by exercising the Priority Levels identified in this MOU.
- To share channels between all qualified public safety entities without respect to discipline and not monopolize the use of any channel.

The preceding conditions are some of the primary requirements for operation of these interoperability channels. They are not a complete list and applicants are referred to the complete SIEC guidelines (attached) for the complete list of operational and technical requirements.

The applicant agency will use these interoperability channels with _____ **(number of mobile/portable units)** and will notify the Region 16 (Kansas) RPC if the number of radios programmed increases by more than 10% of the number of units listed above.

Priority Levels:

1. Disaster or extreme emergency operation for mutual aid and inter-agency communications;
2. Emergency or urgent operation involving imminent danger to life or property;
3. Special event control, generally of a preplanned nature (including Task Force operations)
4. Joint training evolutions (these channels do not qualify for use by single agencies for their secondary communications purposes)

APPENDIX M

To resolve contention within the same priority, assuming all radio equipment is exercising the lowest output and effective radiated power level practicable, the channel should go to the organization with the wider span of control/authority. This shall be determined by Region 16 RPC, or by the levels of authority/government identified in the contention.

For clarification purposes, and as an aid to facilitate inter-agency on scene communications, any fixed base or mobile relay stations utilized for temporary locations (FCC station class FBT or FB2T, respectively), shall, utilize power levels sufficient to effect the necessary operation.

Any violation of this MOU or FCC Rule shall be addressed immediately. The first level of resolution escalation shall be between the parties involved, next the Region 16 (Kansas) RPC, and finally the FCC.

Chairperson, Region 16 (Kansas) RPC **Date**

Applicant/Agency **Date**

Appendices

Appendix A	Committee Membership
Appendix B	County and City Data
Appendix C	Region 16 (Kansas)
Appendix D	Population Data
Appendix E	User Agreements
Appendix F	Participating Agencies
Appendix G	Public Notices
Appendix H	Bylaws
Appendix I	700 MHz Pre-Assignment Rules
Appendix J	DTV Transition
Appendix K	Table of Interoperability Channels
Appendix L	Region 16 (Kansas) 700 MHz General Use Channel Assignment
Appendix M	Region 16 (Kansas) Memorandum of Understanding